

This listing of claims will replace all prior versions, and listings of claims in the application:

**Listing of Claims:**

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1. (original) A method of amplifying a 5kb or longer subsequence of a target nucleic acid in an aqueous solution using a polymerase chain reaction, the method comprising:

(i) contacting the target nucleic acid with a protein comprising at least two heterologous domains, wherein a first domain that is a sequence-non-specific nucleic-acid-binding domain is joined to a second domain that is a polymerase domain with error-correcting activity, where the sequence non-specific nucleic-acid-binding domain:

(a) binds to double-stranded nucleic acid, and

(b) enhances the processivity of the polymerase compared to an identical polymerase not having the sequence non-specific nucleic-acid-binding domain fused to it, and

wherein the solution is of a composition that permits the binding domain to bind to the target nucleic acid and the polymerase domain to extend a primer that is hybridized to the target nucleic acid sequence to a length of 5 kb or longer;

(ii) incubating the solution using a polymerase chain reaction temperature profile that amplifies the 5 kb or longer subsequence.

a!  
2. cancelled herein

3. cancelled herein

4. (original) A method of claim 1 wherein the sequence-non-specific nucleic-acid-binding domain specifically binds to polyclonal antibodies generated against either Sac7d or Sso7d.

5. (original) A method of claim 1 wherein the sequence-non-specific nucleic-acid-binding domain contains a 50 amino acid subsequence containing 50% amino acid similarity to Sso7D.

6. (original) A method of claim 1 wherein the sequence-non-specific nucleic-acid-binding domain specifically binds to polyclonal antibodies generated against Sso7d.

7. (original) A method of claim 1 wherein the sequence-non-specific nucleic-acid-binding domain is Sso7d.

8. (original) A method of amplifying a subsequence of a target nucleic acid in an aqueous solution using a polymerase chain reaction, the method comprising:

(i) contacting the target nucleic acid with a protein comprising at least two heterologous domains, wherein a first domain that is a sequence-non-specific nucleic-acid-binding domain is joined to a second domain that is a polymerase domain with error-correcting activity, where the sequence non-specific nucleic-acid-binding domain:

(a) binds to double-stranded nucleic acid, and  
(b) enhances the processivity of the polymerase compared to an identical polymerase not having the sequence non-specific nucleic-acid-binding domain fused to it, and

wherein the solution comprises  $10^5$  or fewer copies/ml of the target nucleic acid and is of a composition that permits the binding domain to bind to the target nucleic acid and the polymerase domain to extend a primer that is hybridized to the target nucleic acid sequence;

(ii) incubating the solution using a polymerase chain reaction temperature profile that amplifies the subsequence.

9. cancelled herein

10. cancelled herein

11. (original) A method of claim 8 wherein the sequence-non-specific nucleic-acid-binding domain specifically binds to polyclonal antibodies generated against either Sac7d or Sso7d.

12. (original) A method of claim 8 wherein the sequence-non-specific nucleic-acid-binding domain contains a 50 amino acid subsequence containing 50% amino acid similarity to Sso7D.

13. (original) A method of claim 8 wherein the sequence-non-specific nucleic-acid-binding domain specifically binds to polyclonal antibodies generated against Sso7d.

14. (original) A method of claim 8 wherein the sequence-non-specific nucleic-acid-binding domain is Sso7d.

15. (new) A protein comprising two joined heterologous domains:  
~~a sequence non-specific double-stranded nucleic acid binding domain that~~  
(a) specifically binds to polyclonal antibodies generated against Sso7d; or  
(b) comprises an amino acid sequence that has at least 50% identity to a 50 amino acid subsequence of SEQ ID NO:2; and  
a DNA polymerase domain.

16. (new) The protein of claim 15, wherein the presence of the sequence non-specific double-stranded nucleic acid binding domain enhances the processivity of the polymerase domain compared to an identical protein that does not have the sequence non-specific double-stranded nucleic acid binding domain joined thereto.

17. (new) The protein of claim 15, wherein the sequence non-specific double-stranded nucleic acid binding domain and the DNA polymerase domain are covalently linked.

18. (new) The protein of claim 15, wherein the sequence non-specific double-stranded nucleic acid binding domain specifically binds to polyclonal antibodies generated against Sso7d.

19. (new) The protein of claim 15, wherein the sequence non-specific double-stranded nucleic acid binding domain comprises an amino acid sequence that has at least 50% identity to a 50 amino acid subsequence of SEQ ID NO:2.

20. (new) The protein of claim 19, wherein the sequence non-specific double-stranded nucleic acid binding domain comprises an amino acid sequence that has at least 85% identity to a 50 amino acid subsequence of SEQ ID NO:2.

21. (new) The protein of claim 19, wherein the sequence non-specific double-stranded nucleic acid binding domain comprises an amino acid sequence that has at least 75% identity to SEQ ID NO:2.

22. (new) The protein of claim 15, wherein the DNA polymerase domain has thermally stable polymerase activity.

23. (new) The protein of claim 15, wherein the DNA polymerase domain comprises a family A polymerase domain.

24. (new) The protein of claim 23, wherein the family A polymerase domain is a *Thermus* polymerase domain.

25. (new) The protein of claim 23, wherein the family A polymerase domain polymerase domain is a *Taq* polymerase domain.

26. (new) The protein of claim 22, wherein the DNA polymerase domain is a  $\Delta Taq$  domain.

27. (new) The protein of claim 15, wherein the polymerase domain is a family B polymerase domain.

28. (new) The protein of claim 27, wherein the family B polymerase domain is a *Pyrococcus* DNA polymerase I domain.

29. (new) The protein of claim 28, wherein the *Pyrococcus* polymerase domain is a *Pyrococcus furiosus* domain.

30. (new) A protein comprising two joined heterologous domains: a sequence non-specific double-stranded nucleic acid binding domain that comprises an amino acid sequence that has at least 75% identity to the Sac7d sequence set forth in SEQ ID NO:10; and

a DNA polymerase domain.

31. (new) The protein of claim 30, wherein the presence of the sequence non-specific double-stranded nucleic acid binding domain enhances the processivity of the polymerase domain compared to an identical protein that does not have the sequence non-specific double-stranded nucleic acid binding domain joined thereto.

32. (new) The protein of claim 30, wherein the sequence non-specific double-stranded nucleic acid binding domain and the DNA polymerase domain are covalently linked.

33. (new) The protein of claim 30, wherein the sequence non-specific double-stranded nucleic acid binding domain comprises an amino acid sequence that has at least 85% identity to the Sac 7d sequence set forth in SEQ ID NO:10.

34. (new) The protein of claim 30, wherein the sequence non-specific double-stranded nucleic acid binding domain comprises an amino acid sequence that has at least 90% identity to the Sac 7d sequence set forth in SEQ ID NO:10.

35. (new) The protein of claim 30, wherein the DNA polymerase domain has thermally stable polymerase activity.

36. (new) The protein of claim 30, wherein the DNA polymerase domain comprises a family A polymerase domain.

37. (new) The protein of claim 35, wherein the DNA polymerase domain is a *Thermus* polymerase domain.

38. (new) The protein of claim 36, wherein the *Thermus* polymerase domain polymerase domain is a *Taq* polymerase domain.

39. (new) The protein of claim 35, wherein the DNA polymerase domain is a  $\Delta$ *Taq* domain.

40.. (new) The protein of claim 30, wherein the polymerase domain is a family B polymerase domain.

41. (new) The protein of claim 40, wherein the family B polymerase domain is a *Pyrococcus* DNA polymerase I domain.

42. (new) The protein of claim 41, wherein the *Pyrococcus* polymerase domain is a *Pyrococcus furiosus* domain.